Developed Areas in Unconstructed Regional Pond Drainage Areas

Pond No.	Pond Name	% Developed
C-18	Pond C-18	78
C-20	Pond C-20	83
C-21	Pond C-21	88
C-23	Pond C-23	99
C-24	Pond C-24	32
C-28	Pond C-28	53
C-35	Pond C-35	35
C-37	Pond C-37	52
C-39	Pond C-39	100
C-40	Pond C-40	97
C-41	Pond C-41	75
C-53	Pond C-53	95
C-54	Pond C-54	61
C-62	Pond C-62	41
	Cub Run Wgtd. Average =	76
D-01	Pond D-01	92
D-02	Pond D-02	96
D-03	Pond D-03	100
D-05	Pond D-05	87
D-06	Pond D-06	77
D-07	Pond D-07	86
D-09	Pond D-09	95
D-10	Pond D-10	98
D-11	Pond D-11	98
D-12	Pond D-12	96
D-13	Pond D-13	76
D-14	Pond D-14	72
D-151	Pond D-151	52
D-16	Pond D-16	96
D-17	Pond D-17	70
D-18	Pond D-18	92
D-19	Pond D-19	84
D-20	Pond D-20	74
D-21	Pond D-21	67
D-23	Pond D-23	100
D-24	Pond D-24	98
D-27	Pond D-27	95
D-28	Pond D-28	77
D-29	Pond D-29	99
D-30	Pond D-30	94
D-31	Pond D-31	80
D-32	Pond D-32	100
D-33	Pond D-33	100
D-34	Pond D-34	64
D-35	Pond D-35	96

D-36	Pond D-36	87
D-38	Pond D-38	99
D-39	Pond D-39	91
D-40	Pond D-40	83
D-41	Pond D-41	96
D-43	Pond D-43	100
D-45	Pond D-45	99
D-46	Pond D-46	83
D-47	Pond D-47	75
D-51	Pond D-51	80
D-54	Pond D-54	95
D-58	Pond D-58	48
D-59	Pond D-59	100
D-61	Pond D-61	100
D-64	Pond D-64	83
D-65	Pond D-65	87
D-66	Pond D-66	89
D-69	Pond D-69	99
D-71	Pond D-71	55
D-72	Pond D-72	84
D-73	Pond D-73	94
D-74	Pond D-74	90
D-76	Pond D-76	80
D-79	Pond D-79	96
NA	Reston Pond 913	98
	Difficult Run Wgtd. Ave. =	89
H-02	Pond H-02	70
H-07	Pond H-07	93
H-09	Pond H-09	75
H-13	Pond H-13	96
H-16	Pond H-16	98
	Horsepen Wgtd. Ave. =	93
L-06	Pond L-06	84
L-07	Pond L-07	75
L-09	Pond L-09	94
	Long Branch Wgtd. Ave. =	92
P-01	Pond P-01	99
P-02	Pond P-02	80
P-03	Pond P-03	95
P-04	Pond P-04	86
P-05	Pond P-05	100
P-06	Pond P-06	88
P-07	Pond P-07	97
NA	Hatch Lake	91
NA	Hillside Rd.-RedFoxE	85

	Pohick Creek Wgtd. Ave. =	88
R-05	Pond R-05	100
R-08	Pond R-08	80
R-10	Pond R-10	53
R-12	Pond R-12	100
R-13	Pond R-13	85
R-16	Pond R-16	65
R-17	Pond R-17	71
	Little Rocky Wgtd. Ave. =	78
S-01	Pond S-01	94
S-02	Pond S-02	100
S-05	Pond S-05	98
S-07	Pond S-07	83
	Sugarland Wgtd. Ave. =	90
	7 Watersheds Wgtd. Ave.* =	86

*i.e. the weighted average percent developed within regional pond drainage areas in these 7 watersheds.

DRY POND WETLAND ENHANCEMENTS AND RETROFITTING

Regional and On-Site Ponds

1. CURRENT COUNTY WETLAND PILOT PROGRAM

The County is currently in the process of repairing many publicly maintained residential stormwater dry ponds that have experienced structural failure. These ponds no longer provide the water quantity or quality benefits as originally intended and the repairs are necessary to maintain compliance with the County's federally mandated MS-4 permit. The repair work generally results in significant disturbance of the dam embankment, control structure, and pond floor. With these ongoing construction activities and associated restoration requirements, an opportunity has arisen to also provide retrofit elements that enhance the water quality treatment, natural habitat, and aesthetic aspects of the ponds. Though these retrofit elements may vary to a degree from site to site, a complete retrofit project will, where practical, generally conform to the Virginia Department of Conservation and Recreation standards for the installation of shallow marsh wetlands. The pollutant removal efficiencies of these kinds of facilities exceed that of the typical County stormwater quality pond. It is anticipated that additional Best Management Practice (BMP) credits may be obtained through these types of practices and will help meet the intent of the Chesapeake Bay 2000 Agreement and Virginia Tributary Strategies initiative. The additional features that will typically be included in these retrofit projects include the following:

- The installation of sediment basins at the inlets
- The removal of some or all of the concrete low-flow ditches
- The installation of check dams in the portions of low-flow ditch intended to remain
- The installation of shallow marsh pools planted with wetland grasses and other types of wetland and wet meadow plantings (i.e., herbaceous shrubs, ornamental trees, etc.)
- The installation of modifications to the outlet structure and principal spillway pipe

To date, 17 projects have been completed with an additional 7 projects scheduled for completion during the fall 2002 and spring/summer 2003 construction seasons. Three basic design layouts are being implemented, and, as this program is only a pilot, its success with respect to water quality treatment, aesthetic design, maintenance, and public acceptance will be under close evaluation.

2. NEW RETROFIT INITIATIVE FOR MS-4 PERMIT COMPLIANCE

In accordance with NPDES requirements, the County will, in the near future, begin implementing a separate Countywide stormwater retrofit program where older quantity control ponds will be upgraded to meet new water quality standards. The program will entail the retrofitting of 1,100 acres of currently un-treated area on an annual basis. The construction of shallow marsh wetland habitats will be included in this retrofit program as well. There are nearly 1,300 dry ponds in Fairfax County that could potentially be retrofitted under this program. Such an effort will require extensive public outreach and education about water quality improvements. It is anticipated that this outreach project will include the following:

- Presentations to homeowner associations, civic associations, special interest bodies, and school science classes
- Publication of brochures, newspaper articles, and other types of public education documents
- Production of videos

3. IMPLEMENTATION OF WETLAND CONCEPTS AND INITIATIVES WITH NEW DEVELOPMENT

Though the installation of wetlands in stormwater management facilities for new commercial and industrial development is allowed, current regulations prohibit the implementation of such concepts in new residential development. Expanding these concepts to include new residential development will result in the installation of more effective and environmentally sensitive stormwater quality treatment facilities. Expansion of these concepts is in conformance with the In-Fill Study recommendations and the County's overall goal of new technology implementation. In May 2002, a letter was sent to industry and other interested parties encouraging the installation of dry pond wetlands in new residential development.

reg pond task force wetland enhancements and retrofitting discussion 02

Evolution of Stormwater Management in Fairfax County

The concept of stormwater management has changed dramatically over the last century. What follows is a narrative that highlights important milestones in policy changes and implementation in Fairfax County of a stormwater management program. Initially, stormwater control was just about controlling water runoff from storm events and preventing flooding. In later years it has come to include the reduction of pollutants from entering streams and rivers through stormwater and the protection of those same streams and rivers from stream bank erosion, heavy sedimentation and the loss of biological diversity and habitat. The best stormwater management practices protect against stream degradation. If those practices were not originally implemented, then restoration becomes the goal.

During the first part of the 20th century, development in predominantly rural Fairfax County was essentially unregulated, and stormwater controls consisted mostly of ditching fields or pastures to provide drainage for growing crops. Several privately owned reservoirs, such as Lake Barcroft, provided a municipal water supply and also provided limited flood benefits. The basic goal of stormwater controls during this time was to prevent expensive and catastrophic flooding in municipal areas and to remove runoff quickly.

The 1950's were characterized by the rapid urbanization, which followed World War II and a growth in population from 100,000 to 250,000. In general, there was little effort at environmental protection during this time. The County allowed several hundred houses to be built in the floodplain and had to build expensive concrete channels to prevent the flooding of these homes.

With population growing from 250,000 to 450,000 in the 1960's, the County undertook several major initiatives relating to stormwater control. The County contracted with the U.S. Geological Survey to delineate the 100-year floodplain for all streams having a drainage area greater than one square mile, and passed a restrictive Floodplain Ordinance.

Also in the 1960's, under a federal grant, a series of impoundments were initiated in the Pohick Creek Watershed as part of a federally assisted pilot program (Public Law 83-566) administered by the Soil Conservation Service. The purpose of these impoundments was primarily flood control by limiting runoff volumes that allowed suspended materials to settle out. The Pohick Watershed Project work plan, approved in 1967, was a unique effort to control flooding and sedimentation ahead of urbanization. The Pohick Project became a prototype for controlling flooding and sedimentation in other urbanizing areas. The six ponds, Lakes Woodglen, Royal, Braddock, Barton, Huntsman, and Mercer, currently are operated and maintained by Fairfax County through an agreement with SCS which provided the initial construction funding for this project. Also in 1967, Fairfax County passed an erosion and sediment

control ordinance, which became the model for the state erosion and sediment control law enacted in 1972.

In 1964, the County adopted its first Policy and Guidelines Manual, the forerunner of the current Public Facilities Manual (PFM) which sets forth the guidelines which govern the design of all public facilities that must be constructed to serve new development. The early guidelines for stormwater management called for adequate drainage, which usually was achieved through simple curb-and-gutter construction leading to concrete pipes or channels, which emptied into the nearest stream. Drainage was the main focus of stormwater management at this time, and these systems were designed to carry stormwater quickly away from property. While the goal was largely achieved, intense peak flows in receiving streams led to erosion problems. Several large floods, a major one resulting from Hurricane Agnes in 1972, occurred during the 1960's and 1970's. Many homes that had been built on the floodplain required costly flood control structures, prompting the County to limit and control very rigidly any new construction within the 100-year floodplain. Also in the early 1960's, the County began collecting developer contributions (pro rata share) for construction of major drainage improvement channels downstream of development projects.

The early 1970's marked the advent of a strong environmental protection movement nationwide. The federal Clean Water Act of 1972 required states and municipalities to meet certain established water quality standards. Regionally, pesticide and nutrient pollution, much of which was being carried into streams by stormwater runoff, was contributing to the decline of the Chesapeake Bay. This was compounded by heavy inputs of fine sediments from development in the surrounding watersheds.

In the early 1970's, the County began to require all new development to manage stormwater by reducing peak flow rates of the two-year and ten-year design storms to pre-development peak flow rates. This requirement, along with strict enforcement of the erosion and sediment control law, was intended to reduce severe erosion of downstream channels and prevent the transport of large quantities of sediment through the County's waterways. Also, in the 1970's, the County incorporated the Environmental Quality Corridor (EQC) policy, which protects adjacent stream areas from development, into its Comprehensive Plan and a policy for preservation of large areas of stream valleys in open space.

In 1973, the County expanded pro rata share program. The purpose of the program was to require land developers to pay their share of the cost of providing off-site drainage improvements made necessary, or required at least in part, by their development of land. In the late 1970's the County completed a countywide Master Drainage Plan, and the pro rata share program was revised to include some of these projects. The Master Drainage Plan identified existing storm drainage deficiencies along the major streams and tributaries within the County and identified improvements anticipated to be needed as a result of future land development.

By 1980, the County's population had increased to 600,000. Beginning in 1982, the County adopted non-point source pollution abatement measures, commonly known as

best management practices (BMPs), for the Occoquan Watershed to reduce post-development phosphorous runoff by half, and capture many other pollutants. The purpose was to preserve the Occoquan Reservoir, which supplies drinking water for many Fairfax County residents. Some of the BMPs were structural in nature, such as detention ponds, while others were land-use controls, such as the establishment of a special zoning district in 1982 for about two-thirds of the Occoquan Watershed in Fairfax County. This action established a minimum residential lot size of five acres in the special zoning district.

During the 1980's, the County pursued the concept of regional stormwater management on a limited basis through developer cooperation, rezoning proffers, and joint County/developer projects. In order to improve the process, it was deemed necessary to develop an overall plan that identified the most appropriate locations for regional detention facilities and to provide procedures to implement the concept. To promote the concept of regional stormwater management in Fairfax County, the Board of Supervisors requested that a prototype plan be prepared for a portion of the County. The County Executive appointed an Interagency Stormwater Management Committee composed of staff members to oversee the process.

In January 1987, the County contracted with an engineering consultant to study approximately 100 square miles of the rapidly developing portions of the County, for identification of potential regional stormwater management pond sites. The study was initiated to address water quality issues on a Countywide basis, as well as to address flood protection and stream erosion control and to enhance the efficiency and cost-effectiveness of stormwater management in Fairfax County. These "regional ponds" could control larger watersheds (100 to 300 acres) and reduce the maintenance burden to the County by reducing the total number of ponds that would be required to be maintained if they were constructed on individual developments. Regional ponds were viewed as a cost-effective means of controlling erosion and flooding that resulted from increased storm flows associated with development.

In addition to peak-shaving benefits (i.e., flood protection and stream erosion control), the plan was to consider the feasibility of designing the regional detention basins to serve as BMPs for water quality control. The consultant's report noted that the regional approach to stormwater management had many advantages over the traditional onsite deployment of detention basins. These advantages included: increased effectiveness, since regional detention basins could be located strategically to maximize flood protection and erosion control; reduction in capital costs due to economies of scale; reduction in maintenance costs due to the fewer number of required facilities; the capability to implement design features (e.g., access roads) which facilitate maintenance; increased opportunities for open space protection; increased recreational uses due to larger facilities; and the capability to design for adequate access.

The Camp Dresser & McKee consultant study was in line with a recommendation of the Fairfax County Goals Commission chartered by the Board of Supervisors in 1987 to review the goals adopted during 1975 to guide the County's policy and decision-making. In the Environmental Protection section, the Commission recommended "the County

should continue to evaluate the use of large regional stormwater management facilities with respect to size and placement, aesthetics, environmental trade-off and costs/benefits of regional versus localized detention facilities. The 1980's also saw an increase in enforcement of the federal requirement to preserve wetlands and obtain wetlands permits.

At the request of the Board of Supervisors on March 23, 1987, the County established a Safety and Liability Task Force to assess the safety and liability issues of stormwater detention ponds and the long-range financial implications of addressing stormwater management issues. On January 23, 1989, the Board of Supervisors approved the nine recommendations of the Safety and Liability Task Force, the first of which was approval of the Regional Stormwater Management Plan developed by the consultant and overseen by the Fairfax County Interagency Stormwater Committee. The original regional stormwater management plan identified 134 sites, primarily in the western part of the County, for building regional ponds that would control stormwater runoff to reduce peak flow rates, prevent erosion, reduce flooding, and improve water quality. The County planned to phase-in construction of these ponds as stormwater runoff increased in developing watersheds. The Regional Stormwater Management Plan was conceived as a pilot project to be applied Countywide if deemed successful.

By 1990, the County's population had increased to 800,000 and has continued to increase to over a million today. On August 5, 1991, the Board of Supervisors accepted the Status Report on Implementation of Safety and Liability Recommendations for Stormwater Management Ponds prepared by staff. The report included procedures for implementation of the Regional Stormwater Management Plan. The report also provided an update of the implementation of the other eight recommendations of the Safety and Liability Task Force. Funding for implementation of the Regional Stormwater Management Plan was to be provided through a combination of General Funds, future Storm Bond Funds, Pro-rata share contributions, developer participation and possible future establishment of a stormwater utility to generate funds for design, construction and maintenance. Effective in July 1993, the County established a Uniform Pro Rata Share Assessment Program based on a change in the Code of Virginia. The amended legislation allowed pro rata share fees to be aggregated and used immediately for any project within the major watershed in which the fees are collected. Previously, the use of pro rata share funds was limited to projects directly downstream of the development for which they were collected.

In 1993, Fairfax County adopted BMPs countywide as a result of Virginia's Chesapeake Bay Preservation Act and local Chesapeake Bay Preservation Ordinance. The Ordinance established stream corridor areas as Resource Protection Areas (RPAs) and the remainder of the County as a Resource Management Area (RMA) in an effort to protect water resources.

On August 2, 1993, the Board of Supervisors concurred in staff's recommendation and adopted the *Policies and Procedures for Establishing Methods to Protect Wetlands during Implementation of Regional Stormwater Management Ponds*. The Forested Wetlands Committee, an Ad Hoc committee established by the Board of Supervisors,

prepared this document. Some of the recommendations contained in the document were dependent upon future funding.

As a part of the National Pollutant Discharge Elimination System (NPDES) under the Clean Water Act, in 1991 and 1992, Fairfax County submitted its Part 1 and Part 2 applications for a municipal permit from the Virginia Department of Environmental Quality (DEQ) to discharge stormwater into State waters. To obtain this permit, Fairfax County was required to demonstrate that it had an effective stormwater management and monitoring program. In January 1997, the first Fairfax County Municipal Separate Storm Sewer System (MS4) permit was issued (a Virginia Pollutant Discharge Elimination System (VPDES) permit). The permit allows storm sewer pipe outfalls to discharge into streams and requires Fairfax County to monitor, report annually to DEQ, and manage stormwater to reduce non-point source pollution to the "maximum extent practicable." An ongoing monitoring program designed to detect illicit discharges, Countywide chemical monitoring during storm events, dry-weather flow conditions, and conduction of an inspection program are required of the VPDES program.

In September 1998, the County launched a stream protection initiative. The Stream Protection Strategy (SPS) Baseline Study (published in January 2001) gave a temporal view of the condition of the County's streams using biological indicators such as fish and aquatic insects to determine the ecological integrity of the streams and their supportive environment. Fairfax County continued to witness an evolution of new federal and state guidelines and regulations regarding stormwater controls and best management practices to reduce not only erosion and flooding, but also nutrients and sediment from entering into the Chesapeake Bay.

Because dry ponds designed solely to provide quantity controls (detention only dry ponds) do not filter nutrients and sediment adequately, efforts were undertaken beginning in 2000 to determine the feasibility to retrofit approximately 2000 existing stormwater control ponds to include nutrient and sediment controls. This undertaking was in response to the new discharge permit requirements under the County's VPDES permit.

On June 28, 2000, representatives of Virginia, Maryland, Pennsylvania, Washington, DC, the United State Environmental Protection Agency and the Chesapeake Bay Commission signed a new Chesapeake Bay Agreement to reaffirm their commitment to the protection and restoration of ecological integrity, productivity and beneficial uses of the Chesapeake Bay systems. Fairfax County will be expected to develop and implement individual locally supported watershed management plans for each of its watershed by 2010. As noted below, the County already has begun the development of comprehensive watershed management plans.

In October, 2000, the Board of Supervisors approved an amendment to Fairfax County's Policy Plan (the Countywide policy element of the Comprehensive Plan) that established an explicit objective for the protection and restoration of the ecological integrity of streams. This amendment also encourages the use of better site design and low-impact development practices.

In October 2001, the County launched a watershed planning initiative (Watershed Management Plans) for all watersheds to be completed over a 5-7 year period. This effort will update the Master Drainage Plan for flood control and storm drainage improvements developed during the 1970's. Components of the watershed management plans will include: comprehensive field reconnaissance; use of GIS to map stream conditions, storm drainage systems, and stormwater control facilities; development of watershed management goals to achieve improvement in flood and water quality control; restoration of stream habitat and implementation of strategies to protect stream ecosystems; review o f monitoring results from water quality sampling; review of infrastructure deficiencies and maintenance needs; development of alternatives to address identified deficiencies to meet federal, state and County water quality requirements; evaluation and selection of appropriate watershed modeling tools; development of watershed models of all County watersheds to analyze impacts of stream water quality and stormwater quantity for present and future conditions; a general scope and cost of improvement projects; and a formalized public education and information program.

In October 2001, the Department of Public Works and Environmental Services issued a *Letter to Industry* which facilitates the use of certain innovative BMPs allowing requests for their approval to be included as part of plan submissions rather than by a separate letter or waiver request. The 'innovative' BMPs included on the list are types previously approved for similar sites, as well as those documented as effective in the *Virginia Stormwater Management Handbook* to meet water quality improvement criteria.

During the past decade, the County has considered establishment of a stormwater utility to fund its stormwater management program. To date, the County has not pursued a program to institute this type of funding source.

In summary, the policies and methods governing the control of stormwater quantity and quality have evolved as the County has been transformed from a rural to a highly urbanized, populous community. Stormwater management also has changed as a result of increased attention to environmental protection and as a result of increased knowledge of best practices for controlling stormwater while preserving and restoring the environment. Since the adoption of the Regional Stormwater Management Plan, there have been advances in the way stormwater is managed, including managing stormwater as close to the source as practicable. In addition to regional stormwater ponds, other stormwater management practices have been continued or established in order to support water quality efforts in the region and the County's own policies. These better site design and low-impact development methods use a combination of innovative techniques and practices to reduce, detain, retain and filter stormwater closer to the source.

In 2003, the Regional Stormwater Management Plan remains in effect. Currently, approximately 150 regional ponds are included in the Regional Stormwater Management Plan with 46 sites constructed and operational. Developments continue to be approved and constructed under this plan.

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